

**IGBT/SiC Diode Co-pack**

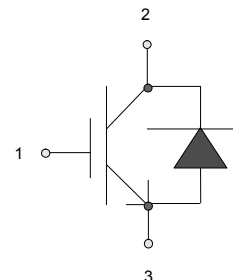
$V_{CES}$	=	1200 V
$I_{CM}$	=	35 A
$V_{CE(SAT)}$	=	3.0 V

**Features**

- Optimal Punch Through (OPT) technology
- SiC freewheeling diode
- Positive temperature coefficient for easy paralleling
- Extremely fast switching speeds
- Temperature independent switching behavior of SiC rectifier
- Best RBSOA/SCSOA capability in the industry
- High junction temperature
- Industry standard packaging

**Package**

- RoHS Compliant


**TO – 247AB**
**Advantages**

- Industry's highest switching speeds
- High temperature operation
- Improved circuit efficiency
- Low switching losses

**Applications**

- Solar Inverters
- Aerospace Actuators
- Server Power Supplies
- Resonant Inverters > 100 kHz
- Inductive Heating
- Electronic Welders

**Maximum Ratings, at  $T_j = 150\text{ }^\circ\text{C}$ , unless otherwise specified**

Parameter	Symbol	Conditions	Values	Unit
<b>IGBT</b>				
Collector-Emitter Voltage	$V_{CES}$		1200	V
DC-Collector Current	$I_{CM}$	$T_c \leq 105\text{ }^\circ\text{C}$	35	A
Gate Emitter Peak Voltage	$V_{GES}$		$\pm 20$	V
Operating Temperature	$T_{vj}$		-40 to +150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-40 to +150	$^\circ\text{C}$
<b>Free-wheeling diode</b>				
DC-Forward Current	$I_F$	$T_c \leq 105\text{ }^\circ\text{C}$	35	A
Non Repetitive Peak Forward Current	$I_{FM}$	$T_c = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ }\mu\text{s}$	tbd	A
Surge Non Repetitive Forward Current	$I_{F,SM}$	$t_p = 10\text{ ms}$ , half sine, $T_c = 25\text{ }^\circ\text{C}$	tbd	A

**Thermal Characteristics**

Th. Resistance Junction to Case	$R_{thJC}$	IGBT	0.34	K/W
Th. Resistance Junction to Case	$R_{thJC}$	SiC diode	0.31	K/W

**Mechanical Properties**

Mounting Torque	$M_d$	Values		
		min.	typ.	max.
		1.5		2

<http://www.genesicsemi.com/index.php/sic-products/copack>

**Electrical Characteristics**

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
<b>IGBT</b>						
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE} = V_{GE}^*$ , $I_C = 0.6 \text{ mA}$ , $T_J = 25^\circ\text{C}$	5.5	6	6.5	V
Collector-Emitter Leakage Current	$I_{CES,25}$	$V_{GE} = 0 \text{ V}$ , $V_{CE} = V_{CES}^*$ , $T_J = 25^\circ\text{C}$		0.02	0.2	mA
	$I_{CES,150}$	$V_{GE} = 0 \text{ V}$ , $V_{CE} = V_{CES}^*$ , $T_J = 150^\circ\text{C}$		0.3		mA
Gate-Leakage Current	$I_{GES}$	$V_{CE} = 0 \text{ V}$ , $V_{GE} = 20 \text{ V}$ , $T_J = 25^\circ\text{C}$			500	nA
Collector-Emitter Threshold Voltage	$V_{CE(TO)}$	$T_J = 25^\circ\text{C}$		1.1		V
Collector-Emitter Slope Resistance	$R_{CE,25}$	$V_{GE} = 15 \text{ V}$ , $T_J = 25^\circ\text{C}$		50		m $\Omega$
	$R_{CE,150}$	$V_{GE} = 15 \text{ V}$ , $T_J = 150^\circ\text{C}$		87.5		m $\Omega$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = 35 \text{ A}$ , $V_{GE} = 15 \text{ V}$ , $T_J = 25^\circ\text{C}(150^\circ\text{C})$		3.0(3.9)		V
Input Capacitance	$C_{ies}$	$V_{GE} = 0 \text{ V}$ , $V_{CE} = 25 \text{ V}$ , $f = 1 \text{ MHz}$		tbid		nF
Output Capacitance	$C_{oes}$			tbid		nF
Reverse Transfer Capacitance	$C_{res}$			tbid		nF
Gate Charge	$Q_g$	$V_{CC} = 800 \text{ V}$ , $I_C = 35 \text{ A}$ , $V_{GE} = 15 \text{ V}$		50		nC
Reverse Bias Safe Operating Area	RBSOA	$T_J = 125^\circ\text{C}$ , $R_g = 56\Omega$ , $V_{CC} = 1200 \text{ V}$ , $V_{GE} = 15 \text{ V}$		45		A
Short Circuit Current	$I_{sc}$	$T_J = 125^\circ\text{C}$ , $R_g = 56\Omega$ ,		60		A
Short Circuit Duration	$t_{sc}$	$V_{CC} = 900 \text{ V}$ , $V_{GE} = \pm 15 \text{ V}$			10	$\mu\text{s}$
Rise Time	$t_r$	$V_{CC} = 800 \text{ V}$ , $I_C = 35 \text{ A}$ , $R_{gon} = R_{goff} = 22 \Omega$ , $V_{GE(on)} = 15 \text{ V}$ , $V_{GE(off)} = -8 \text{ V}$ , $T_J = 125^\circ\text{C}$		85		ns
Fall Time	$t_f$			205		ns
Turn On Delay Time	$t_{d(on)}$			40		ns
Turn Off Delay Time	$t_{d(off)}$			232		ns
Turn-On Energy Loss Per Pulse	$E_{on}$			2.66		mJ
Turn-Off Energy Loss Per Pulse	$E_{off}$			4.35		mJ
<b>Free-wheeling diode</b>						
Forward Voltage	$V_F$	$I_F = 35 \text{ A}$ , $V_{GE} = 0 \text{ V}$ , $T_J = 25^\circ\text{C} (150^\circ\text{C})$		2.6(3.5)		V
Threshold Voltage at Diode	$V_{D(TO)}$	$T_J = 25^\circ\text{C}$		0.8		V
Peak Reverse Recovery Current	$I_{rrm}$	$I_F = 35 \text{ A}$ , $V_{GE} = 0 \text{ V}$ , $V_R = 650 \text{ V}$ $-di_F/dt = 300 \text{ A}/\mu\text{s}$ , $T_J = 125^\circ\text{C}$		3.01		A
Reverse Recovery Time	$t_{rr}$			36		ns
Diode peak rate of fall of reverse recovery current during tb	$di_{rr}/dt$			190		A/ $\mu\text{s}$

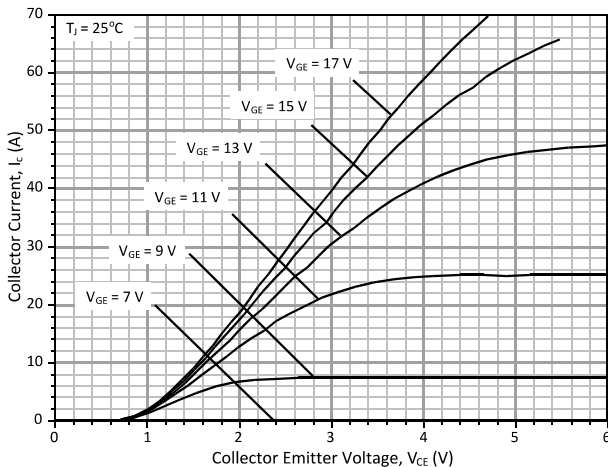


Figure 1: Typical Output Characteristics at 25 °C

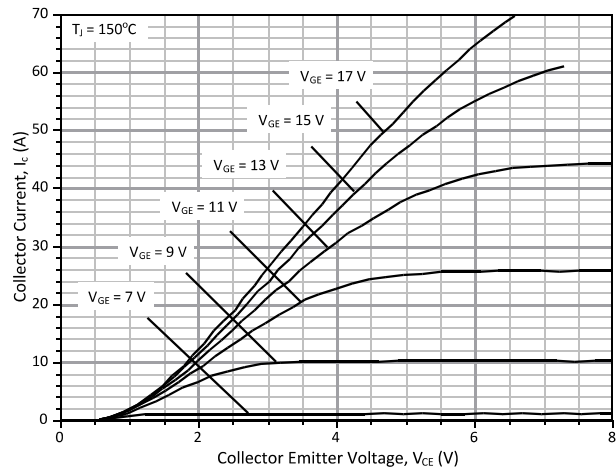


Figure 2: Typical Output Characteristics at 150 °C

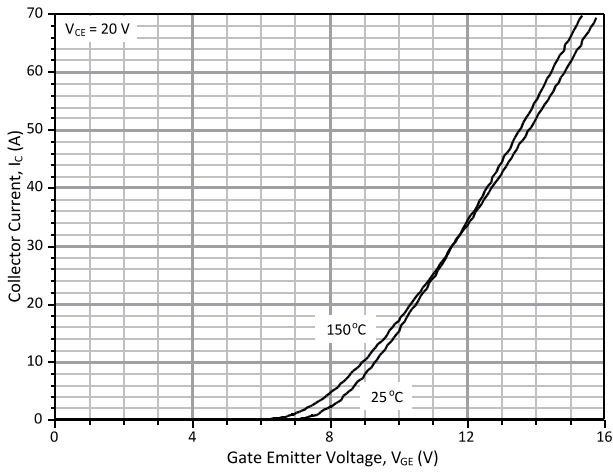


Figure 3: Typical Transfer Characteristics

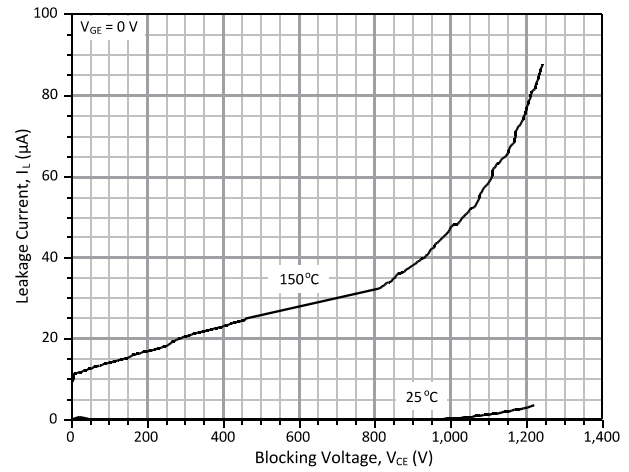


Figure 4: Typical Blocking Characteristics

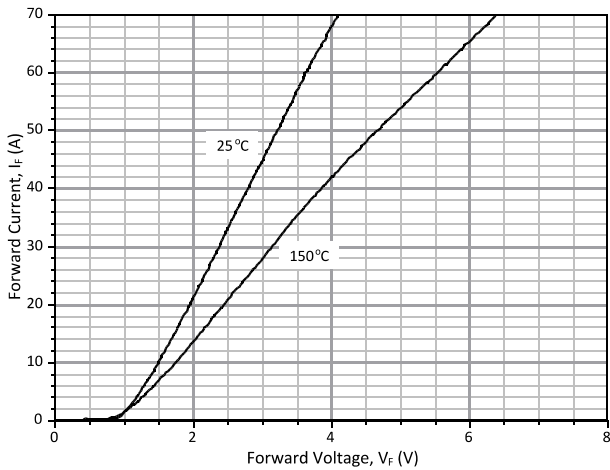


Figure 5: Typical FWD Forward Characteristics

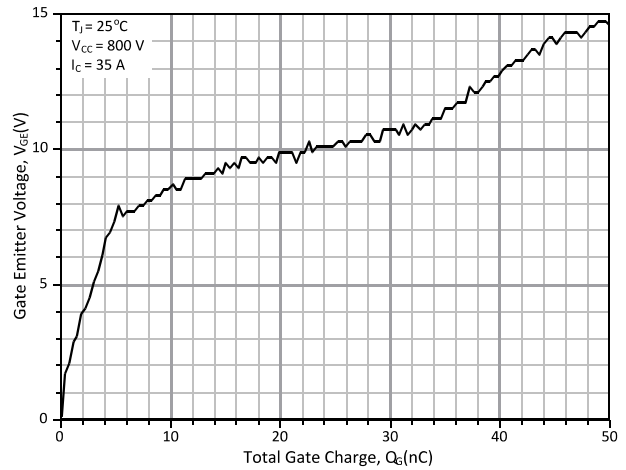


Figure 6: Typical Turn On Gate Charge

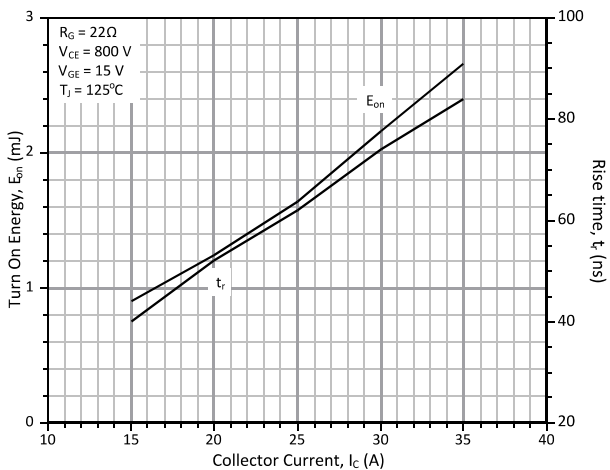


Figure 7: Typical Turn On Energy Losses and Switching Times

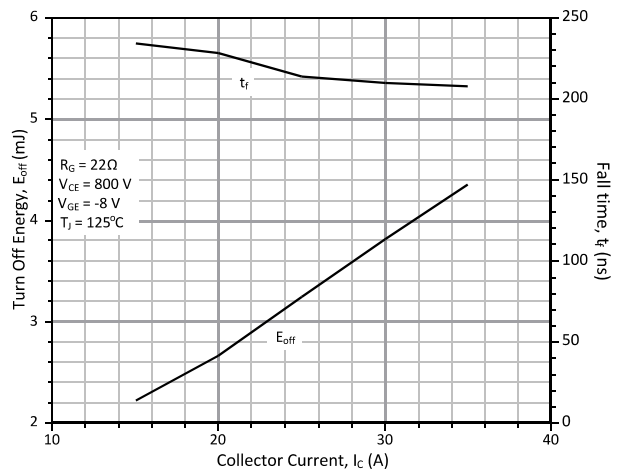


Figure 8: Typical Turn Off Energy Losses and Switching Times

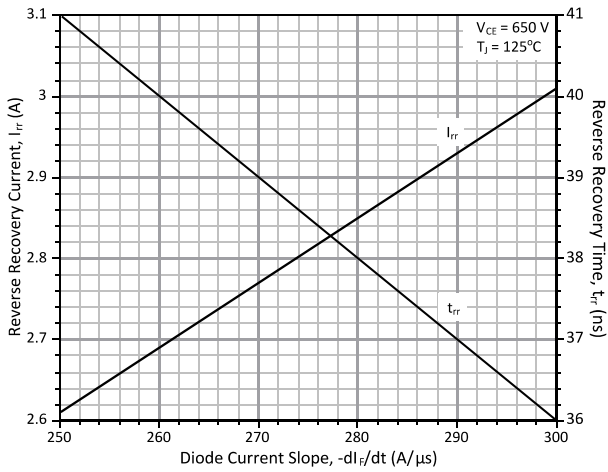
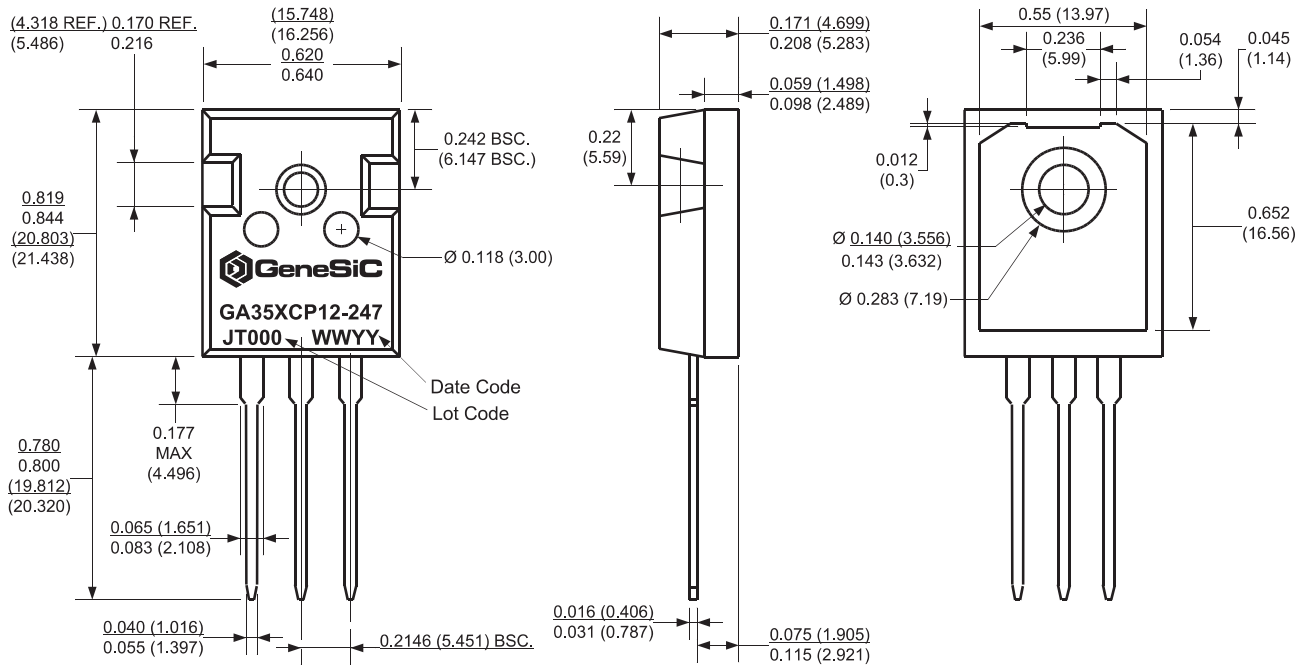


Figure 9: Typical Reverse Recovery Currents and Times

**Package Dimensions:**

**TO-247AB**

**PACKAGE OUTLINE**



**NOTE**

1. CONTROLLED DIMENSION IS INCH. DIMENSION IN BRACKET IS MILLIMETER.
2. DIMENSIONS DO NOT INCLUDE END FLASH, MOLD FLASH, MATERIAL PROTRUSIONS

**Revision History**

Date	Revision	Comments	Supersedes
2011/01/06	1	First generation release	

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